

REMARKS/ARGUMENTS

Based on the Office Action dated April 23, 2004, claims 1, 4-13, 15-34, 36-43 and 45-51 are pending. Claims 17, 31 and 47 are allowed. Claims 1, 4-13, 15, 16, 18-30, 32-34, 36-43, 45, 46, and 48 are rejected.

Reconsideration of currently pending claims 1, 4-13, 15-34, 36-43, and 45-51 is respectfully requested.

Claim Rejections Under 35 U.S.C. § 103 (a)

Claims 1, 5-10, 14-16, 19, 21-24, and 28-30 are rejected under 35 U.S.C. 103 (a) as being unpatentable over U.S. Patent No. 5,910,659 to Johnson et al. in view of U.S. Patent No. 4,754,139 to Ennulat et al.

Johnson discloses a two structure device having an infrared source element 100 stacking on a separate structure of source spatial decorrelator 200 (SSD) leaving a separation distance between the two structures (Figure 2). The infrared source element 100 employs membrane 110 which suspends heater element 105 so as to bridge the cavity 125 (Col. 4, lines 26-27 see Figure 2). The SSD is provided with reflective surfaces 210 to increase the optical fill ratio or factor of the thermal cell (Col. 4, lines 57-60; Col. 5, lines 13-17). The SSD may be thermally isolated from the heater elements to maintain a low thermal time constant for the heater (Col. 3, lines 31-35). The purpose of the Johnson patent is thus to provide a thermal cell with performance otherwise requiring a substantially larger heater element (Col. 5, lines 17-19). While the techniques of using a SSD to improve radiometric collection efficiency (Col. 5, lines 36-38), and these SSD structures could be used for optical signal detection and optical imaging (Col. 9, lines 58-62), Johnson contains no teaching, suggestion, or motivation to provide a membrane with borders extending between the perimeter of the absorber and the plurality of reflecting surfaces, and thermally isolating the absorber from the frame.

Further, Ennulat adds nothing further in regards to such a structure, instead Ennulat urges that the collector array be thermally isolated from the detector array (Col. 6, lines 36-38).

Ennulat discloses an infrared sensor that is substantially different from the infrared sensor of the present invention. Ennulat's sensor comprises an array of radiation concentrators 1 positioned directly above but spaced from a plurality of detectors 4, the detectors being supported on a detector support structure 2. (see Column 4, lines 44-49). The support structure 2 is a separate piece from each of radiation concentrators 1. (see Figures 1-3). The purpose of support structure 2 is to mechanically support widely spaced detectors with minimum thermal conductance and to electrically connect these detectors to underlying integrated circuit chip 3. (Column 5, lines 30-33). In Figures 1-2, detectors 4 are supported by relatively thin and narrow support ribbons 8 which bridge the interstices of the structure 2 with a low thermal conductivity material. (Column 4, lines 35-38).

Based on the claims 1, 19 and 33, the membrane is contiguously disposed on the frame (having reflecting surfaces) to thus form an integrated single structure. This feature makes the sensor of claims 1, 19 and 33 patentably distinct from the infrared sensor of Ennulat which has the ribbon 8 disposed on a separate structure from the reflecting surfaces. Because the membrane of claims 1, 19 and 33 is an integrated part of the frame (having reflecting surfaces), the assembling of the infrared sensor of claims 1, 19 and 33 is simpler. Ennulat contains no teaching, suggestion, or motivation to provide a membrane with borders extending between the perimeter of the absorber and the plurality of reflecting surfaces, and thermally isolating the absorber from the frame.

Further, the amended claims 1, 19 and 33 now include the recitation of the membrane borders that extend between the perimeter of the absorber and the reflecting surfaces. Ennulat's ribbon 8 does not provide any boarders that extend between the perimeter of the absorber and the reflecting surfaces for thermally isolating the absorber. In contrast, Ennulat teaches that the irradiance of the area 9 is concentrated on the detector 4 within an area which is about equal to the output area 10 of each concentrator 1 (Column 5, lines 13-15). As shown in Figure 2 of Ennulat, output area 10 is defined by the bottom end of the reflecting surfaces, thus the perimeter of detector 4 of Ennulat extends to the reflecting surfaces (see Figures 2-3). The detector 4 and the reflecting surfaces are separated by electrical leads 11 or feedthroughs 12 (see Figures 2-3).

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Adding borders of ribbon 8 to detector 4 would make the size of detector 4 smaller than area 10, being in conflict with the teaching of Ennulat.

Even assuming that the artisan would be motivated by the statements in Johnson to make the wholesale substitutions suggested by the Examiner, the resulting combination at best would be to space the correlator from the absorber (Johnson Col. 3, lines 31-33, Ennulat Col. 6, lines 36-38) rather than providing a membrane with borders extending between the perimeter of the absorber and the plurality of reflecting surfaces, and thermally isolating the absorber from the frame. Johnson and Ennulat's teachings regarding the thermal isolation does not provide a membrane with borders extending between the perimeter of the absorber and the plurality of reflecting surfaces, and thermally isolating the absorber from the frame. Based on the foregoing reasons, the rejection based on Johnson and Ennulat should be withdrawn, and independent claims 1, 19 and 33 and their dependent claims should be allowed.

Claims 4, 20, 33, 34, 36-40, 45, and 46 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Johnson and Ennulat et al. as applied to claims 1, 5-10, 15, 16, 19, 21-24 and 28-30 and further in view of U.S. Patent No. 6,335,478 to Chou et al.

As stated above, Johnson and Ennulat do not teach or suggest the structure of the membrane of claims 1, 19 and 33. Chou's purported disclosure of a thermocouple does not teach or suggest such features either. There is nothing in Johnson, Ennulat and/or Chou that teaches, motivates or suggests a combination thereof. Even if the references are combined, the sensors of claims 1, 19, and 33 will not be achieved for the lack of an integrated structure and the membrane boarder features.

Based on the foregoing reasons, the rejection based on Johnson, Ennulat and Chou should be withdrawn.

Claims 11, 13, 18, 25, 27, and 32 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Johnson and Ennulat as applied to claims 1, 5-10, 15, 16, 19, 21-24 and 28-30 above and further in view of U.S. Patent No. 5,962,854 to Endo.

Claims 11, 13, 18, 25, 27, and 32 now depend from amended independent claim 1 or 19, both of which include a membrane contiguously disposed on the frame (having reflecting surfaces) and membrane borders not taught by any valid combination of Johnson and Ennulat. Endo does not disclose, teach or suggest these features, either. There is nothing in the references that teaches, suggests or motivates a combination thereof, and even if the references are combined, the infrared sensor of claims 11, 13, 18, 25, 27, and 32 will not be achieved due to the lack of the membrane contiguously disposed on the frame and membrane borders. Accordingly the rejection of these claims based on Ennulat in view of Endo should be withdrawn.

Claims 41, 43, and 48 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Johnson and Ennulat and Chou as applied to claims 4, 20, 33, 34, 36-40, 45, and 46, and further in view of Endo.

Claims 41, 43, and 48 now depend from amended independent claim 33 which includes a membrane contiguously disposed on the frame and membrane borders not taught by any valid combination of Johnson, Ennulat, Chou or Endo. Combining the references will not result in the claimed invention for the lack of the membrane contiguously disposed on the frame and the membrane borders. Accordingly, the rejection of these claims should be withdrawn.

Claims 12 and 26 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Johnson, Ennulat and Endo as applied to claims 11, 13, 18, 25, 27, and 32, and further in view of U.S. Patent No. 6,107,925 to Wong.

As stated hereinabove, no valid combination of Johnson, Ennulat and Endo teaches or suggests the claimed membrane contiguously disposed on the frame and membrane borders. Wong does not teach or suggest any thermal insulating membrane. Therefore combining of the references will not result in the infrared sensor of claims 12 and 26. Thus, the rejection of these claims should be withdrawn.

Claim 42 is rejected under 35 U.S.C. 103 (a) as being unpatentable over Johnson, Ennulat, Chou, and Endo as applied to claims 41, 43, 48, and further in view of Wong.

Similar to what has been discussed hereinabove, claim 42 now depends from amended claim 33, which includes the claimed membrane contiguously disposed on the frame and

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membrane borders. No valid combination of Johnson, Ennulat, Chou, Endo and Wong teaches or suggests these claimed features. There is nothing in the cited references that suggests or motivates the combination thereof. As stated earlier, the combined references will not yield an infrared sensor having a thermal insulating membrane contiguously disposed on the frame as a single integrated unit. Therefore the rejection of claim 42 should be withdrawn.

Claims 17, 31 and 47 are allowed according to the office action dated April 23, 2004.

Claims 49-51 depend from claims 1, 19 and 33 which should be allowed as discussed hereinabove. Thus, claims 49-51 should also be allowable.

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CONCLUSION

Applicants believe that the application, as amended, is now in allowable form and action toward that end is respectfully requested. In the event any extension of time or payment of fee is required, Applicants hereby authorize any charges to be made to Deposit Account No. 02-0390, BAKER & DANIELS.

If any issues remain that can be resolved by telephone, Examiner Smith is invited to call the undersigned attorney at (317) 237-0300.

Respectfully Submitted,

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(37 C.F.R. § 1.8(a))

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Kevin R. Erdman